AMENDMENTS TO THE CLAIMS

1. (Previously Presented) Actuator (14) for use in a microfluidic system (10), wherein said microfluidic system (10) comprises a fluid network in a substrate (12) consisting of at least one microchannel (20) arranged for transporting fluids; and an electrical connection means (16) for application of an electric field (E) across a segment (20a) of said microchannel (20) such that electroosmotic flow is induced in said segment (20a), characterized in that said segment (20a) comprises conducting means (18), wherein a surface portion of said conducting means (18) is curved, or inclined with respect to the electrical field (E), and the space between the different conducting means (18), and between the conducting means (18) and the channel walls (20b) is between 0 a_{char} and 2 a_{char} , and the surface of the conducting means is smooth, i.e. the surface irregularities are less than 5% of d_{char}, where the characteristic diameter d_{char} is the dimension of the conducting means measured in parallel to the direction of the externally imposed electric field and the characteristic radii a_{char} equals 0.5 times d_{char}.

2. (Previously Presented) Actuator (14) in accordance with claim 1, wherein the space between the different conducting means (18), and between the conducting means (18) and the channel walls (20b) is between between 1/8 a_{char} and ½ a_{char}, and the surface of the conducting means is smooth, i.e. the surface irregularities are less than 1% of d_{char}.

3. (Previously Presented) Actuator (14) in accordance with claim 1, wherein the conducting means (18) has the shape of ellipsoids, spheres, cylinders, elliptical cylinders or cones.

4. (Previously Presented) Actuator (14) in accordance with claim 1, wherein the conducting means (18) consist of small cylinders with the longitudinal axis normal with respect to the fluid flow direction.

5. (Previously Presented) Actuator (14) in accordance with claim 1, wherein the conducting means (18) has the shape of particles with planes which are inclined with respect to the imposed electric field.

6. (Previously Presented) Actuator (14) in accordance with claim 1, wherein the particles constituting the conducting means (18) have a size of 0,1 μm– 5 mm, preferable 10 μm to 500 μm, measured in parallel to the externally imposed electric field.

7. (Previously Presented) Actuator (14) in accordance with claim 1, wherein the angle λ between the inclined surface portion and the microchannel walls (20b) is 0 – 80 degrees.

8. (Previously Presented) Actuator (14) in accordance with claim 7, wherein the angle λ between the inclined surface portion and the microchannel walls (20b) is 30 – 60 degrees

9. (Previously Presented) Actuator (14) in accordance with claim 1, wherein the conducting means (18) contains several layers of conducting particles, both axially and longitudinally in relation to the flow direction.

10. (Previously Presented) Actuator (14) in accordance with claim 1, wherein the conducting means (18) consist of a ionic or electronic or hole conducting material.

11. (Previously Presented) Actuator (14) in accordance with claim 1, wherein the conducting means (18) has a conductivity of at least 5 times the conductivity of said fluid, or preferable of at lest 10 times the conductivity of said fluid.

12. (Previously Presented) Actuator (14) in accordance with claim 1, wherein the electrical connection means (16) contains a pair of electrodes arranged upstream or downstream with respect to the microchannel segment (20a).

13. (Previously Presented) Actuator (14) in accordance with claim 1, wherein the electrical connection means (16) is adapted to provide an electrical field (E) parallel to the direction of the transported fluid.

14. (Previously Presented) Actuator (14) in accordance with claim 1, wherein the electrical connection means (16) applies an alternating field.

15. (Previously Presented) Actuator (14) in accordance with claim 1, wherein the electrical connection means (16) applies an alternating field which has sine, square, triangular or sawtooth shape, or a combination of said shapes.

16. (Previously Presented) Actuator (14) in accordance with claim 1, wherein the electrical connection means (16) applies an alternating field where the signal has an offset resulting in a strong and a weak pulse within the signal period, and also a duty – cycle of preferably 29%, so that the strong pulse lasts 29% of the signal period, and where the offset and duty cycle are tuned to give a zero average direct electric signal component.

17. (Previously Presented) Actuator (14) in accordance with claim 1, wherein the electrical connection means (16) applies an alternating field where the signal has an overloaded direct component.

18. (Previously Presented) Actuator (14) in accordance with claim 1, wherein the electrical connection means (16) applies an alternating field where the electric signal is applied in the potentiostatic regime.

19. (Previously Presented) Actuator (14) in accordance with claim 1, wherein the electrical connection means (16) applies an alternating field with a maximum amplitude in V/mm equal to or larger than an amplitude for which the base -10 - logarithm is in the linear interval between -2 and 2, for corresponding a_{char} [μm] for which the base -10 – logarithm is in the linear interval between 0 and 3.7.

20. (Previously Presented) Actuator (14) in accordance with claim 1, wherein the electrical connection means (16) applies an alternating field with a signal period in seconds equal

to or larger than a period for which the base -10 - logarithm is in the linear interval between -6 and zero, for corresponding a_{char} [μm] for which the base -10 – logarithm is in the linear interval between 0 and 3.

21. (Previously Presented) Actuator (14) in accordance with claim 1, wherein the electrical connection means (16) applies a direct electric field.

22. (Previously Presented) Actuator (14) in accordance with claim 1, wherein the distance between each electrical connection means (16) and the conducting means (18) is between 0.1 and 5 mm.

23. (Previously Presented) Actuator (14) in accordance with claim 1, wherein the electrical connection means (16) contains four electrodes, two electrodes (16b) for inducing the SCR, and two electrodes (16) for setting ions in the fluid in motion (16a).

24. (Previously Presented) Actuator (14) in accordance with claim 23, wherein a first pair of electrodes (16a) is arranged upstream or downstream of said segment (20a) of the microchannel (20), anywhere in the microchannel (20) or microfluidic system (10), and wherein the second pair of electrodes (16b) is positioned on each side of said segment (20b).

25. (Currently Amended) Actuator (14) in accordance with claim 23~~-or 24~~, wherein the electrical connections means (16) and (16b) each applies an alternating electric field~~s in accordance with claims 14-20~~, where the two electric fields are out of phase.

26. (Previously Presented) Actuator (14) in accordance with claim 1, wherein the conducting means (18) is a portion of the microchannel wall (20b) effecting a deflection of the local electrical field so that the field is inclined with respect to the conducting means (18).

27. (Currently Amended) Use of an actuator (14) in accordance with ~~one of the claims 1-26~~ claim 1 as a micropump in a microfluidic system (10).

28. (Currently Amended) Use of an actuator (14) in accordance with ~~one of the claims 1-26~~ claim 1 as a mixer in a microfluidic system (10).

29. (Currently Amended) Use of an actuator (14) in accordance with ~~one of the claims 27 or 28~~ claim 27, wherein the microfluidic system (10) is used for drug delivery.

30. (Currently Amended) Use of an actuator (14) in accordance with ~~one of the claims 27 or 28~~ claim 27, wherein the microfluidic system (10) is used in a "lab – on – a - chip" assembly.

31. (Currently Amended) Use of an actuator (14) in accordance with ~~one of the claims 27 or 28~~ claim 27, wherein the microfluidic system (10) is used for electronics cooling.